Teaching End-user Remote Online Searching

CHRISTINE BRUCE *User Education Coordinator, Queensland University of Technology Library*

ABSTRACT

The Queensland University of Technology (QUT) Library has recently commenced teaching higher degree students to search online systems such as BRS, ORBIT and STN. The emphasis is on education rather than training, with students being required to familiarise themselves with system commands and database structures whilst receiving necessarily limited tutorial help. The teaching strategies used and problems encountered in the program are outlined. Student responses to the experience of learning to online search are discussed.

Introduction Trends in online education in Australian universities have been reported by Fjällbrandt[1,2] and Duffill[3]. These accounts allude to education in the concepts of searching and the demonstration of 'live' or 'canned' searches. There are also instances of students being taught remote online searching, for example in the QUT Law Library, and these are now being reported in the literature[4]. Teaching end-user online searching has been, and continues to be popular outside Australia. Recent reports include those of Dennis[5], Fjällbrandt[6], Friend[7], Fleming[8], and Sullivan, Borgman and Wippern[9]. In 1989, inspired by the Chalmers University of Technology model, the QUT Library negotiated the inclusion in university curricula of a subject for postgraduate students engaged in research. This subject, Advanced Information Retrieval Skills, teaches remote online searching amongst other aspects of information competencies. Some reflections on our experiences during 1990 and 1991, the first two years of the subject's implementation, form the basis of this article. Managing student online searching, the teaching strategies adopted, problems encountered, student strategies and responses to the online experience are discussed.

Managing Student Online Searching Managing student online searching has involved the selection of appropriate vendors and ensuring cost effective, easy access. Over a two year period close to 200 students have engaged in learning to search online.

Selection of Appropriate Vendors Teaching students how to search online naturally requires that they be able to access online systems at reasonable rates. The availability of Maxwell Online's Instructor Programme means that students have access to a wide range of complete databases on ORBIT and BRS, providing an authentic online experience. Student passwords are provided at substantially reduced rates for teaching purposes, with the proviso that these passwords not be used for research; students are therefore restricted in the number of references retrieved whilst searching. Instructor passwords for STN were introduced in 1991.

Of the three systems we are using for the learning experience, each has its advantages. STN is the cheapest of the three. It has an unusual range of files and CAL packages are available to help students learn the command language and

database structure for specific files. STN is used primarily by chemistry students. Maxwell Online's BRS and ORBIT systems provide a very wide range of databases at a flat rate, except that print charges apply to the instruction provided on ORBIT. Documentation for students is also supplied free of charge, and up to two instructors are able to attend system 'refresher' courses annually. From a teacher's perspective I encourage students to use the BRS system unless this is quite inappropriate to their subject areas. (Geology students would fall into this category.) The flat charging rate, which includes print costs, and provision of documentation, makes the BRS instructor password the most attractive teaching proposition. It allows students maximum independence and relieves librarians of their inevitable concern: cost.

Ensuring Cost-effective, Easy Access Initially, students were expected to be independent at the terminal, logging themselves on and off, with a librarian at call in case of emergencies. We soon discovered that considerable time was saved, and many problems circumvented if students were logged on and off systems by librarians. High levels of student and staff frustration have been reduced, and students are assured of being able to access systems with minimum trauma. As logoff procedures are properly conducted, the chances of successful access for the next searcher are better. The principle of 'autonomy at the terminal' has also meant special security measures. As staff and students conduct searches on the same terminal, a menu for each group is accessible through passwords known to library staff only. Further, we do not teach students to capture to disc as this gives them access to DOS, violating security.

Each student is allocated one hour of online time and has access to tutoring from a subject specialist librarian in the search design, redesign process. Increasing numbers participating in the subject have led to allocated online time being reduced from two hours to one. The availability of CD-ROM for experimentation with search strategies has made this feasible.

Teaching Strategies Students are encouraged to use CD-ROM databases (menu-driven modes at least) before they attend a class on online database searching. They are expected to have an understanding of controlled vocabulary, to have done some literature searching, and to understand basic concepts such as 'access points'. During the class we look at:

Different Technologies Used for Information Storage and Retrieval Here students are introduced to compact disc, online systems, and videodisc. They discuss the characteristics of these systems and the relative advantages and disadvantages of each. This is a critical session for influencing student attitudes towards technology.

Basic Concepts of Electronic Searching Concepts[10] of database and bibliographic records including fields and access points are the initial focus. This is followed by examining the process of dividing a topic into sets for development of a strategy, using free-text terms or controlled vocabulary and linking sets with Boolean operators.

Stages in Creating a Search Topics covered in this section range from selecting databases, creating a search strategy, to translating the strategy for input into the system. Field searching and proximity operators are all dealt with here.

Narrowing and Broadening Searches/Zero Sets Students understanding of electronic information searching concepts is tested here as the class discusses how to deal with 'unexpected' problems.

Demonstration of Sample Searches 'Canned' searches are discussed with students, outlining different types of search techniques. These searches also illustrate 'model' searches where strategies are saved, run on subsequent databases, adapted as required, etc.

Detailed Discussion of at Least One Database to be Used by Students Each student group spends at least one hour with a subject librarian reviewing techniques for searching a specific database. The databases involved are typically Medline, Georef, Inspec, Compendex, Biosis, and CAS online. Some groups who have more than one database to search where special help is warranted have class instruction on more than one database. Typically these are students in medical related disciplines who rely on Medline plus Biosis. Students are then expected to translate their knowledge of how to design searches to other databases, using appropriate searching aids. Students are not expected to manage more sophisticated applications such as patent searching or citation searching online. Where compact discs are available the students search using that technology and update, or search further retrospectively online.

Problems Encountered in Teaching and Learning Problems encountered in teaching and learning the online search process are many and varied. Problems from the learner's perspective were identified through a survey of an initial group of 15 students. These appear in the tables below. Observations from the librarian's viewpoint are also outlined.

Student Responses In order to identify students' responses to searching, some of the students were asked to comment on their response to the prospect of doing an online search, the problems they encountered as they prepared and conducted their search, aspects of instruction they would recommend for emphasis in future courses, and whether they benefited from the experience. The questions asked were open-ended as I wished to influence students' responses as little as possible. Summary answers are listed in Tables 1, 2 and 3. Not surprisingly, the main difficulties identified by Friend[11] at Penn State University were also apparent here. These problems concerned access to documentation, identifying appropriate terminology, understanding Boolean logic and search modification.

Some students expanded a little on their responses. One indicated that her feelings changed from negative to positive before and after instruction. Another student stated that his fear was a result of a lack of knowledge of how the system worked. Yet another indicated that his negative response was due to a misconcep-

tion of the potential of online searching. The need to be prepared, and incurring costs were mentioned by two students.

Table 1. Student response to the prospect of doing an online search

With dread
I was not very optimistic
I was very pleased
With fear (initial fear only)
Panic
Positively, it could be useful [two responses]
Didn't know what it was
Looked forward to it
Bemused . . . an abstract concept
I didn't think it would be any great advantage
My initial reaction was favourable

Table 2. Problems encountered

Utter confusion with so many databases
Identifying key words [three responses]
Reducing the outcome
Locating thesaurii
Zero results
Systems failure [four responses]
Logon/off procedure [three responses]
Methods of constructing the search
Condensing the search strategy
Field searching
Learning curve in using system commands
Development of the search statements
The logic that was required to be used

The most commonly encountered problems were clearly logon/logoff procedures. These would account for 'system failures'. Students are no longer expected to master these procedures or downline loading.

Librarians' Observations

(a) *Varied Familiarity with Computers.* Some students are computer wizards,

Table 3. Aspects recommended for emphasis in future courses

Being shown all manuals, lists of headings and databases
Controlled vocabulary
Logon/logoff procedures [four responses]
In class hands-on practice
System commands [two responses]
Printing procedures
File transfer
Downloading to disc

others are simply scared of the machines. Sessions are very much aimed at demystifying the process of online, electronic searching, and ensuring that students feel comfortable with the idea of planning and running a search. Although we try to make students as independent as possible where they are clearly uncomfortable, a librarian does remain with them for initial practice sessions. Naturally where this is not necessary it is not encouraged as the process can be very demanding on the librarian's time. Continuous supervision is in fact becoming increasingly impracticable. A useful technique is to encourage students to take up their online bookings in pairs. Mutual support goes a long way towards increasing confidence.

(b) *Varying Conceptions and Misconceptions of Online Searching.* Very early in the session on electronic searching it is necessary to spell out the nature of online searching and how it differs from CD-ROM searching. Some students initially confuse 'online' searching with searching the online catalogue or OPAC. This was noticed in students' responses to pretest questions. A small number of students simply have a knowledge gap; they have no idea what online searching may be.

(c) *Assistance with Specialist Databases.* Although the general principles/concepts approach seems to have worked, students do need specific tutorial guidance with specialist databases like Medline/Biosis and Chemical Abstracts. Extra class contact time has to be scheduled for students falling into these categories.

(d) *Students Transferring Habits Acquired from CD-ROM Use to Online Systems.* In particular some students who had approached CD-ROM with limited preparation and developed an initial strategy through trial and error felt they should be able to do the same online. Also the capacity of CD-ROM to enable the selection of a highly specific set by browsing through all generated records made it difficult for some students to accept that this was not always appropriate behaviour whilst online.

Adjustments to Teaching Strategies After taking some 70 students through the experience of learning 'system independent' aspects of online searching, the mechanics of searching particular databases, then integrating their knowledge

through implementation, I made some adjustments to classroom teaching strategies.

(a) *Field Searching was Further Emphasised.* Although I initially took students through the various fields of a bibliographic record, and these have been described as searchable, many students did not apply the idea in practice. To encourage them to use field searching when developing strategies I now describe and demonstrate field searching as the bibliographic record is discussed. The application of the concept is specifically pointed out. It is also returned to and reinforced when developing search statements is looked at; this latter aspect has always been incorporated in the lesson plan. Hopefully, a hook has been created in students minds through the earlier discussion.

(b) *Boolean Logic.* Most students, although not all, are comfortable with the idea of Boolean logic as it applies to two sets. Most students fall into error when a third set is introduced. A class exercise has been inserted to help students with this.

(c) *Proximity Operators.* Although discussed in class, students made limited use of these. I now demonstrate in more detail how these can be used to narrow and broaden strategies. Training videos can be used with good effect to reinforce this.

(d) *A Sixth Basic Concept.* To the five noted in the literature[12] I have added a sixth: 'Database vendor or host'. Students need to understand the function of the vendor in the distribution of online databases or CD-ROM databases.

(e) *Enforced Feedback.* Although we try to avoid imposing requirements on this postgraduate group, an evaluation of the initial program recognised that feedback on a search strategy designed prior to the first online practice session was essential. Students are now required to produce a signed search profile before taking up their first online booking. This also provides an excellent opportunity to discuss specific search protocols and strategies with students on a one-to-one, or small group basis.

(f) *Changed Teaching Sequence.* I now familiarise students with online searching principles and techniques before moving on to CD-ROM. In practice they will use CD-ROM first. Nevertheless this prevents a sloppy approach to online, and CD-ROM, searching.

Student Strategies Student strategies varied in sophistication. Some of the more sophisticated techniques attempted by students include:

1 Longitude/latitude searching — in the case of geology students using Georef
2 BIOSIS Concept Codes
3 MEDLINE Tree Numbers
4 Changing databases, saving and re-executing searching
5 Field searching titles/abstracts
6 Limiting by year
7 A small number of students went beyond classroom instruction and did author searches.

A few students became competent searchers. Interestingly, these were not necessarily the most computer literate of the group. They devised excellent strategies,

interacted well with the databases and modified their strategies appropriately for the different databases searched. A small number of students became familiar with the command languages of two or three systems; evidently the availability of command mode searching on compact disc facilitated this.

Clearly these students were not in the majority. Most successfully conducted a search on their topics but did not attempt to focus their searches, through field specification or other interesting protocols. Although sophisticated search profiles were not achieved, admittedly in many cases they would also have been unnecessary.

The rigors required by online systems for which large sums are being paid can continue to be misunderstood by students who have had only limited experience with online systems. One student who had quickly mastered online searching techniques wished to conduct an online search on an aspect of his research which had recently come to light. Library staff agreed that the student should prepare his search and conduct it himself, under supervision, on Georef. The student had searched Georef previously. When the time came to search, the student revealed that he wished to search on 'diorite', limiting to the English language and citations post-1980. On being questioned, the student said that he had searched the print indexes extensively; he had found very few references in each volume searched. Being the cautious type, I decided that we should use the exercise as a learning experience; I asked him to conduct the search on a student password.

Inevitably on a free-text search the term 'diorite' generated thousands of references. Limiting by date to 1980 onwards and limiting by language did not reduce the number of hits significantly; neither did searching for diorite as an indexing term. Combining the first concept with gold did reduce the set to under 1 000 documents; limiting this final set to Australia was far too severe; less than five documents remained. Needless to say the student was perplexed. As he did not simply wish to limit his set to a certain number of very recent documents he needed to think more about his search strategy. I left him browsing through references on CD-ROM.

Responses to the Online Experience Despite some frustration, even trauma, students surveyed had mainly positive things to say about their online searching (Table 4). This was evidently a valuable learning experience for them.

Whither End-User Online Searching? Should we continue to teach students to engage in remote online searching? Is this necessary given the growing popularity of CD-ROM? Is it worth the costs and the trauma, in the early stages at least, to students and librarians? Should we be making end-user online searching available to students who have 'learned' the process? These questions continue to be grappled with in the QUT Library.

Responses or philosophies clearly differ. Prevailing at this stage is the idea that researchers benefit from an understanding of the scope and capacities of online systems. They, and their research, benefit from developing a search strategy themselves. Increasingly, researchers in chemical, medical and other laboratories are searching online without an intermediary. At the very least, researchers are better prepared to discuss search requests and results with the librarian searching

Table 4. Benefits gained from preparing and conducting an online search

I could never have got this very relevant information otherwise
It showed me how important it is to do my own searches or at least provide more information
I can see how much time it saved on searching information
This is a very useful technique. I will use it more in future
Promoted confidence in computer searching
Broadened my knowledge of where to search for information
I learnt a new method of information collection
Realised that it is more complicated than it looks
I can now understand the system and may find it useful in future
Learnt the benefits of access to a large source of information and how to tap that source
No, 'cause I had got most of the references already
It did pull out references I wasn't aware of (and more up-to-date ones than were available in the print media)
I now know the steps required to successfully initiate a search. And the variety of databases and their field of interest they cover
It was a valuable experience and learning aid
My firm has for some time been struggling with the problem of keeping up to date ... in specialist areas ... I see the prudent use of the online facility as one of the tools that may be utilised

on their behalf. Shielding research students from a direct online search experience would be to curtail the development of their information skills.

Conclusion Teaching online searching to postgraduate students, across many disciplines and in growing numbers, is no easy task. It is fraught with administrative difficulties, where limited terminals and staff are available. It is a challenging teaching endeavour, dealing with differing subject areas and levels of skill to deal with. Despite all this, teaching end-user searching is a satisfying role for librarians, and students claim, at least, to be benefitting in their university research and in the workplace.

Notes

1 Nancy Fjällbrandt 'Online Education Round the World : The Use of Online Information Retrieval in Australian Institutions of Higher Education' *User Education in the Online Age* IATUL Proceedings 14 1982 pp19-27.
2 Nancy Fjällbrandt 'Education in the Use of Online Information Retrieval in Australian Institutions of Higher Education' *Australasian College Libraries* vol 1 no 1 1983 pp27-32.
3 Carol Duffill 'Strategies for User Education for Graduate Students' *User Education in the Online Age 2* IATUL Proceedings 17 1985 pp163-71.
4 Terry Hutchinson 'Hornbooks, Slip Sheets and Pocket Parts : Legal Research and Writing

in a University Library' in *Achieving Excellence : Proceedings of the 4th Asian Pacific Special and Law Librarians' Conference with 9th Biennial Health Librarians' Conference, Canberra, 1-5 Sept 1991* pp283-93.
5 Nancy Dennis 'New Technologies for Information Retrieval : A Three Credit Course for Undergraduates at Salem State College' *RSR* vol 18 no 1 1990 pp39-46.
6 Nancy Fjällbrandt 'Recent Trends in Online User Education' *IATUL Quarterly* vol 2 no 4 1988 pp228-36.
7 Linda Friend 'Independence at the Terminal : Training End Users to do Online Literature Searching' *Journal of Academic Librarianship* vol 11 no 2 1985 pp136-41.
8 Hugh Fleming 'Educating the Future End-user of Online Information Services' in Hugh Fleming (ed) *User Education in Academic Libraries* Library Association London 1990.
9 MV Sullivan, CL Borgman and D Wippern 'End Users Mediated Searches and Front End Assistance Programs on Dialog : A Comparison of Learning Performance and Satisfaction' *JASIS* vol 41 no 1 1990 pp27-42.
10 Joan Lippincott 'End User Instruction : Emphasis on Concepts' in M Rachel and M Ramey (eds) *Conceptual Frameworks for Bibliographic Education : Theory into Practice* Libraries Unlimited Colorado 1987.
11 Friend p140.
12 Lippincott p185.